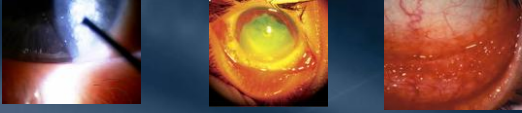


Treatment and Management of Challenging Anterior Segment Cases



Nicholas Colatrella, OD, FAAO, Diplomate AAO, ABO, ABCMO
Jeffrey R. Varanelli, OD, FAAO, Diplomate ABO, ABCMO

Disclosures

- Allergan/AbbVie
- BioTissue
- Katena/Corza
- Dompé
- Viatris
- Kala
- Merakris Therapeutics
- Bausch+Lomb
- Zeiss

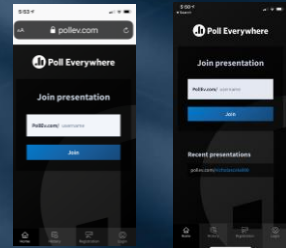
There are no conflicts of interest in this program as all conflicts have been mitigated.

Nicholas Colatrella, OD, FAAO, Dipl AAO, ABO, ABCMO Jeffrey Varanelli, OD, FAAO, Dipl ABO, ABCMO



Live Quiz: www.pollev.com

- Username: nicholascola090
- Or from the app
 - enter: nicholascola090



What is your biggest pet peeve?

Nobody has responded yet.
Hang tight! Responses are coming in.

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Case 1

Case Report

- 55 yo WF Jody M
- CC: red eyes OU. Burning, tender, with associated yellowish discharge, itching and tearing
 - Approximately 6 weeks duration (last visit 4 months ago)
- Oc Hx
 - POAG – Pre Tx IOP OD 30, OS 43, (Dx approx. 1 ½ year prior)
 - C/D OD .4, OS .75
- Med Hx
 - Brain Aneurysm R side 2003
 - HTN
- Meds
 - HCTZ
 - Wellbutrin SR
 - Latanoprost Qhs OU
 - Timoptic XE Qam OU

Case Report

- Va CC 20/20 OD, OS, OU
- PERRL, EOM, CVF
- SLE
 - External – ? PA node
 - L/L – mild edema
 - Conj OU- 2+ injection
 - Follicular reaction 2-3+
 - Lower lid >> upper
 - Cornea – clear
 - AC / I – Clear
 - Lens – Clear
 - IOP OD 21, OS 27
 - Higher than normal (OD 15,12,17,13,16 / OS 16,13,19,12,18)



Classify Conjunctivitis into 4 Categories

- (1) Time course
- (2) Morphology
- (3) Localization of disease process
- (4) Type of discharge or exudate

- (A) 1 week 0%
- (B) 2 weeks 0%
- (C) 3 weeks 0%
- (D) 4 weeks 0%

Start the presentation to see live content. For screen share software, share the entire screen. Get help at patlex.com/app

Classification: Time Course

- _____ weeks is the dividing point as it is the upper limit for cases of viral infection and most bacterial infections to resolve without treatment
 - Acute Conjunctivitis
 - Conjunctivitis that has been present for less than 3 weeks
 - Adenoviral
 - Herpes Simplex
 - Inclusion (chlamydial) – if caught early
 - Newcastle disease (poultry handlers or veterinarians)
 - Enterovirus
 - Cat-Scratch Fever
 - Chronic Conjunctivitis
 - Conjunctivitis that has been present for greater than 3 weeks

Classification: Morphology

- Morphologic classification can be broken down into five categories:
 - (1) Papillary
 - (2) Giant papillary
 - (3) Follicular
 - (4) Membranous/pseudomembranous
 - (5) Cicatrizing

Papillary

- All forms of conjunctivitis will have some form of papillary hypertrophy
- Papillae are described as elevations of the conjunctiva with a central core blood vessel
- As the conjunctiva becomes thickened by infiltration with inflammatory cells, the individual papillae are created by septae that are fibrous connections of the epithelium to the underlying substantia propria
- Each papilla is then seen as a red dot, which represents the core blood vessel viewed on end
- Normally, visualization of individual papillae is difficult
 - In papillary hypertrophy, the normal vascular pattern becomes obscured, and in extreme cases obliterated, by the inflammatory process

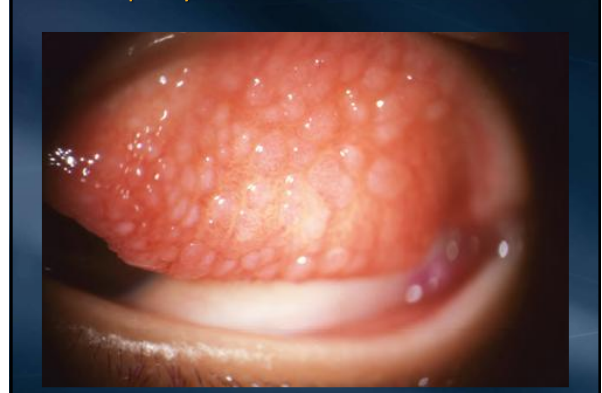
Papillary



Giant Papillary

- When the individual septae separating papillae break down, multiple individual papillae merge to form a giant papilla
- Giant papillae are conjunctival elevations that are greater than 1 mm in size
- Most commonly occur on the upper tarsal conjunctiva, but in some cases can be seen on the lower tarsal conjunctiva
- They usually have flat tops and seem to fit together like cobblestones, hence the descriptive term "cobblestone papillae"

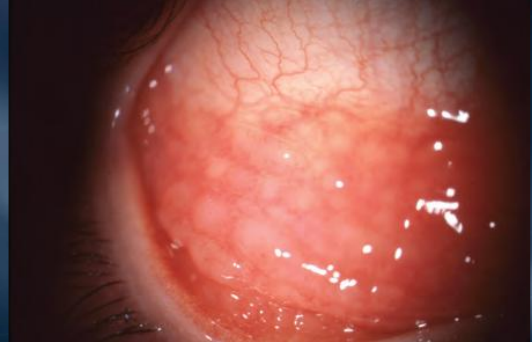
Giant Papillary



Follicular

- Dome-shaped conjunctival elevations with a circumferential blood vessel and clear center
- Histopathologically, follicles are aggregations of mononuclear inflammatory cells that are organized similarly to follicles within lymph nodes
- When follicles are present in conjunction with papillary hypertrophy, there is a follicular conjunctivitis

Follicular



Follicle vs Papillae

• Papillae



Note the fibrovascular core in which the blood vessels arborize on reaching the surface.

• Follicle



Note the large follicles with blood vessels sweeping up from the base over the convexity

Membranous/Pseudomembranous

- Membranes and pseudomembranes are sheets composed of a network of fibrin and inflammatory cells that form a layer over the surface of the conjunctiva
- True membranes have a growth of capillaries from the conjunctiva into the membrane, while pseudomembranes are avascular
- Either type of membrane is a sign of severe inflammation where the conjunctiva is very friable, and stripping either type of membrane causes bleeding

Membranous/Pseudomembranous



Cicatrizing

- Some forms of conjunctivitis lead to progressive conjunctival scarring, or cicatrization
- Findings associated with cicatrization include:
 - stellate or linear subconjunctival scars
 - shortening of the conjunctival fornices
 - formation of symblepharon
 - eventual ankyloblepharon
 - cicatricial entropion
 - loss of conjunctival goblet cells leading to conjunctival and corneal keratinization
- Patients with pre-existent scarring are not immune to the causes of acute conjunctivitis
- Concurrence of scarring and inflammation is not enough to confirm a diagnosis of cicatrizing conjunctivitis; this diagnosis is made when chronic conjunctival inflammation is associated with progressive cicatrization

Cicatrizing



Classification: Anatomic Localization

- Different forms of conjunctivitis tend to affect different areas of the external eye
- Determining the predominant area of inflammation can contribute to making an accurate diagnosis
- Some conditions have significant involvement of the eyelids as well as the conjunctiva
 - Chronic blepharitis
 - Molluscum contagiosum
 - Atopic Keratoconjunctivitis
- Some primarily affect the upper palpebral conjunctiva
 - Vernal keratoconjunctivitis (VKC)
 - Trachoma
 - Superior limbic keratoconjunctivitis (SLK)

Classification: Anatomic Localization

- Some primarily affect the lower palpebral conjunctiva
 - Inclusion conjunctivitis
 - Toxic conjunctivitis
- Other entities involve the bulbar conjunctiva
 - keratoconjunctivitis sicca
- Many forms of chronic conjunctivitis have significant corneal involvement, termed Keratoconjunctivitis
- Most forms of chronic conjunctivitis are bilateral, although often asymmetric
- Some are unilateral
 - Lacrimal drainage infections
 - Ocular surface tumors

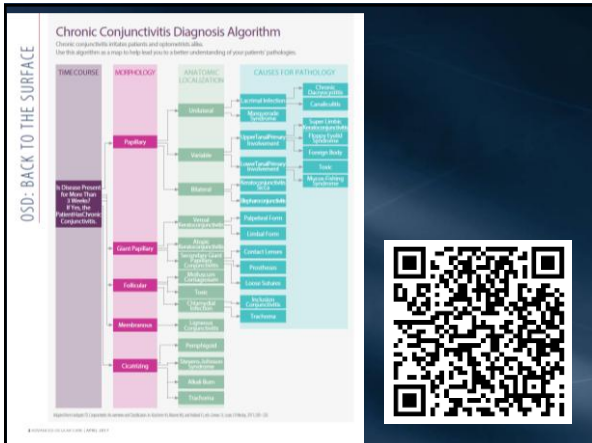
Classification: Discharge / Exudate

- As part of the inflammatory process, blood vessels have increased permeability, leading to leakage of serum, proteins, and inflammatory cells, creating an exudate
- Exudates can take different forms:
 - Grossly purulent exudates are seen in hyperacute conjunctivitis.
 - These are always acute diseases.
 - Watery exudates are seen in viral infections
 - Always acute diseases
- The most common type of exudate is mucopurulent (or catarrhal), representing a mixture of mucous and pus
- In some allergic conditions such as VKC, there can be a mucoid exudate, a thick, tenacious discharge that can be peeled intact off the conjunctival surface, often revealing a cast of the morphology of the conjunctival surface



Case Example

- (1) Time course
 - > 3 weeks, Yes, was 6 weeks maybe longer... Chronic
- (2) Morphology
 - Mostly Follicular.....Follicular
- (3) Localization of disease process
 - Mainly lower lid
- (4) Type of discharge or exudate
 - Mucopurulent



Case Report

- **DDx –**
 - Viral Conjunctivitis
 - Time course doesn't fit. No PA node or Hx of exposure – Fits a Chronic Follicular Conjunctivitis
 - Chlamydial / Trachoma vs Inclusion Conjunctivitis
 - Maybe? Did cultures in office
 - Molluscum Contagiosum
 - Lash line was clear and no signs of Molluscum anywhere on face or body
 - Drug Toxicity / Toxic conjunctivitis
 - Was recently switched to different generic of latanoprost / ? tolerability of new med vs preservative reaction from preservatives in glaucoma meds

Case Report

- **Treatment**
 - Stop latanoprost (continued TXE), Add Lotemax BID
 - RTO 2 weeks
- Pt reports minimal improvement noted
 - Still 1-2+ injection with follicles
 - IOP 14, 15
 - Plan
 - Stop TXE and increase Lotemax Q2h
 - RTO 1 week, wrote Rx for Zioptan, but hold on starting
- Reports eyes finally feeling much better, and not as bothersome
 - Less injection and less papillary rxn
 - IOP 22,26 (off all glc meds)
 - Start Zioptan, RTO 2 weeks
- Feeling best yet, back to normal
 - Conj quiet
 - IOP 17, 18
 - Continue Zioptan QHS OU , eventually started Timoptic in Ocusose

Case 2

Case Report

- 37 yo WM Michael W.
 - Cook at Chipotle trying to clean things and close for the night (August 2023).
 - Pulled too hard on bottle of cleaner (undiluted Victory Wash) and got splashed in right eye.
 - Not wearing safety glasses
 - No eye wash in building
 - Washed with some water at faucet in building
 - Took shower when got home
 - Went to medical clinic next day
 - Didn't do anything, and told him to follow up at our office
 - Followed up next day (two days since injury)

First things first – irrigate and neutralize

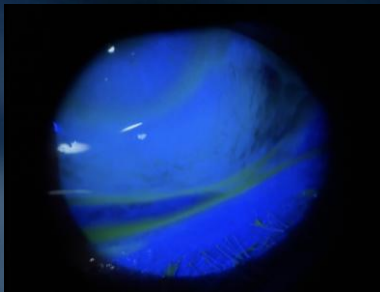
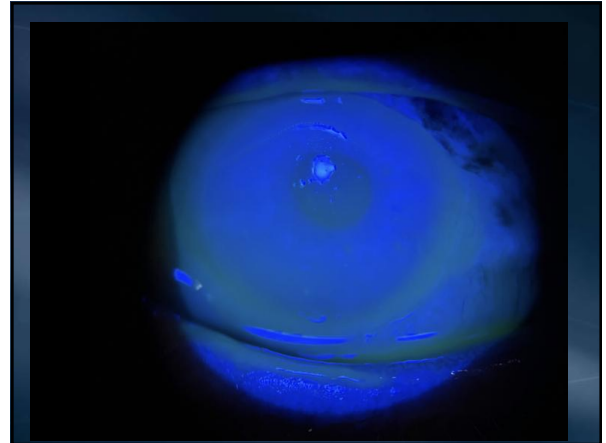
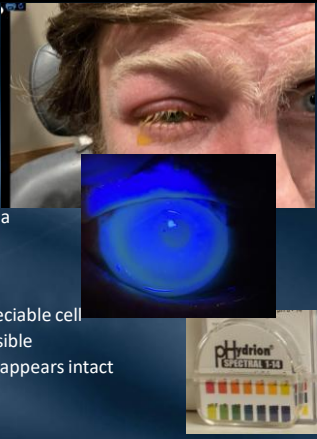
- Irrigated
 - Even though it's been 3 days
- Ensured pH was neutral first
 - Checked OU
 - Was 7.0



Case Report

37 yo WM Michael W.

- Day 3
 - OD blurry and painful
 - pH = 7 (in office)
 - VA cc 20/60 PH 20/40
 - L/L erythema and edema
 - Swollen shut
 - Conj – 2-3+ injection–
 - Defect ??
 - A/C view hazy but appreciable cell
 - Iris details somewhat visible
 - Fundus – difficult views appears intact
 - T(a) ??



- Cornea OS- 99% Epithelial defect w sloughed tissue along edges
- Approx 1/2 + limbal involvement
 - OS clear

ECOLAB SAFETY DATA SHEET	
VICTORY	
SECTION 1. PRODUCT AND COMPANY IDENTIFICATION	
Product name	: VICTORY
Other means of identification	: Not applicable
Recommended use	: Sanitizer
Restrictions on use	: Reserved for industrial and professional use.
Product dilution information	: US EPA not tested, refer to product label when applying this product.
Company	: Ecolab Inc. 370 N. Wabasha Street St. Paul, Minnesota USA 55102 1-800-352-5326
Emergency health information	: 1-800-328-0026 (US/Canada), 1-651-222-5352 (outside US)
Issuing date	: 03/10/2016
SECTION 2. HAZARDS IDENTIFICATION	
GHS Classification	
Oxidizing liquids	: Category 3
Organic peroxides	: Type F
Acute toxicity (Oral)	: Category 3
Skin corrosion	: Category 1A
Serious eye damage	: Category 1

SAFETY DATA SHEET

VICTORY

Ingredients with workplace control parameters

Ingredients	CAS-No.	Form of exposure	Permissible concentration	Basis
Acetic acid	64-19-7	TWA	10 ppm	ACGIH
		STEL	15 ppm	ACGIH
		STEL	15 ppm	NIOSH REL
		TWA	10 ppm	NIOSH REL
		TWA	25 mg/m ³	OSHA Z1
		TWA	10 ppm	OSHA Z1
Peroxyacetic acid	79-21-0	STEL	0.4 ppm	ACGIH
Hydrogen peroxide	7722-84-1	TWA	1 ppm	ACGIH
		TWA	1 ppm	NIOSH REL
		TWA	1.4 mg/m ³	NIOSH REL
		TWA	1 ppm	OSHA Z1
		TWA	1.4 mg/m ³	OSHA Z1

Engineering measures : Effective exhaust ventilation system. Maintain air concentrations below occupational exposure standards.

Personal protective equipment

Eye protection : Wear eye protection/ face protection.

Hand protection : Wear the following personal protective equipment: Standard glove type. Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough.

Skin protection : Personal protective equipment comprising: suitable protective gloves.

and body in case of contact or splash hazard.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

	Product AS SOLD	Product AT USE DILUTION
Appearance	liquid	liquid
Color	colorless	colorless
Odor	vinegar-like	vinegar-like
pH	1.8, 100 %	3.5
Flash point	96 °C closed cup. Does not sustain combustion.	
Odor Threshold	No data available	
Melting point/freezing point	No data available	

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SAFETY DATA SHEET

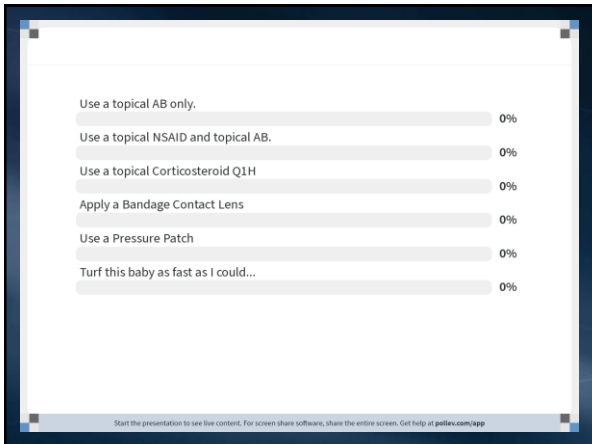
VICTORY

Initial boiling point and boiling range : > 100 °C

Evaporation rate : No data available

Flammability (solid, gas) : No data available

Lower explosion limit : No data available



Etiology of Chemical Burns

- Ocular burn injuries
 - Chemical (acid, alkali) – True Ocular Emergency
 - Radiant (thermal, UV)
- Epidemiology
 - Eye injuries account for 4-7% of workplace injuries
 - 84% are chemical burns
 - Location of Chemical Injuries
 - Workplace injuries (66%)
 - Safety glasses are no match for strong chemicals under high pressure
 - Construction sites
 - Chemical plants
 - Machine factories
 - Home based injuries (33%)
 - Most serious injuries by lime and drain cleaners
 - Safety glasses helpful
 - School based (1%)

Etiology of Chemical Burns

- Incidence
 - 30 per 10,000
 - 82-91% men
 - Occurring in prime of life 16-45 yo
 - 90% accidental
 - Alkali make up majority of accidents – 2x acids
 - Automotive battery acid burns are increasingly common – during recharging of lead-acid storage battery (25% sulfuric acid, hydrogen and oxygen gases)
 - Colder months, after dark, young men, igniting match to look at battery, improper use of cables
 - Intentional
 - Most occurring as a results of assault
 - ½ were chronic alcoholics – 32% intoxicated at time of admission
 - Luckily most chemical injuries are mild with a good prognosis

Concentration of hydrogen ions compared to distilled water	pH	Examples of solutions at this pH
10,000,000	pH = 0	battery acid, strong hydrofluoric acid
1,000,000	pH = 1	hydrochloric acid secreted by stomach lining
100,000	pH = 2	lemon juice, gastric acid, vinegar
10,000	pH = 3	grapefruit, orange juice, soda
1,000	pH = 4	tomato juice, acid rain
100	pH = 5	soft drinking water, black coffee
10	pH = 6	urine, saliva
1	pH = 7	"pure" water
1/10	pH = 8	sea water
1/100	pH = 9	baking soda
1/1,000	pH = 10	Great Salt Lake, milk of magnesia
1/10,000	pH = 11	ammonia solution
1/100,000	pH = 12	soapy water
1/1,000,000	pH = 13	bleaches, oven cleaner
1/10,000,000	pH = 14	liquid drain cleaner

Chemical Injuries of the Cornea

- Acid- low pH
- Alkali- high pH
- Irritant- neutral pH
- Surfactants – detergents – neither acid or alkali
 - Cationic, anionic, non-ionic
 - BAK
 - Liquid dishwashing detergent
- Modifying factors
 - Duration of contact
 - Solution pH
 - Solution quantity
 - Solution penetrability

Acid Burns

- Intact corneal epithelium affords moderate protection against penetration of dilute or weak acids
 - Little damage seen unless pH \leq 2.5
 - Acids bind to corneal proteins and act as chemical barrier
 - Severe damage if epithelium removed
- Cause protein coagulation in corneal epithelium
 - Also acts as barrier
 - Ground glass appearance
- Usually non-progressive and superficial
 - Hydrofluoric acid is exception
 - Fluoride ion penetrates stroma
 - Acts as alkali

Alkali Burns

- Substances that have basic pH
- More severe than acid burns
 - As pH rises, emulsification of lipids in cell membranes occur
 - Destroying barriers to penetration facilitating deeper penetration to Ant Segment
 - Injurious effect on stroma involves:
 - Temporary binding of alkali cations to corneal mucoproteins and collagen
 - Rapid destruction of corneal mucoproteins
 - Hydration of glycosaminoglycans results in stromal haze
 - Increasing as the pH is raised above 11.5
 - Lipophilic
 - Penetrate more rapidly than acids
 - Detectable levels in A.C. in seconds to minutes
 - Once external pH is restored to normal can take 30 min -3 hr to neutralize AC, depending on penetration
 - Collagen fibril distortion and shortening, leading to trabecular meshwork alterations
 - inflammatory mediators released stimulate the release of prostaglandins

Treatment - Irrigation

- Irrigation
 - Tetracaine
 - Lid speculum
 - Physiological saline
 - Tap water better?
 - Borate buffer (greater reduction in aqueous pH)
 - Amphoteric substances (Diphoterine or Previn solutions)
 - Available at many workplaces and hospitals, especially Europe
 - paracentesis and reformation of the anterior chamber with phosphate buffer if w/in 15 min, not after 30 min

The Morgan Lens®

• Effective, easy to use ocular irrigation

• Frase medical personnel to treat other injuries

• Developed by a practicing ophthalmologist

• Used in 95% of U.S. emergency department

EYE WASH STATION

Treatment - Irrigation

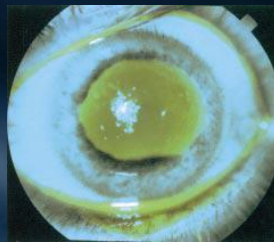
- Must neutralize pH first
 - Goal 7.0 to 7.2
 - Check every 15-30 minutes
 - pH testing OU, even if claims only one eye affected
 - Trapped particles will cause pH change after initial normalization
 - Special attention to fornix



Carolina Biological supplies. www.Carolina.com

Grade I

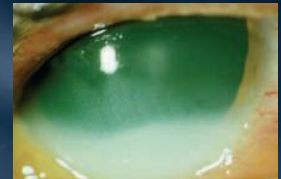
- Involves corneal epithelium only
- Limbal stem cells spared
- Cornea remains clear
 - Epithelium denuded
 - No opacity
- No limbal ischemia
- Prognosis: Excellent for full recovery of normal corneal appearance and function



Grade 1 ocular surface burn.

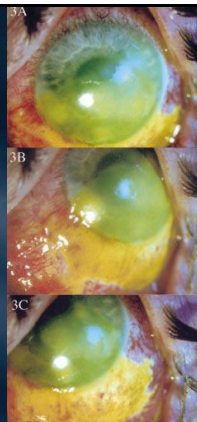
Grade II

- Partial loss of limbal stem cells
- Focal limbal ischemia
 - < 1/3 of limbus
- Cornea is hazy, but anterior segment structures are visible
- Prognosis: Good
 - Concerns:
 - Persistent epithelial dysfunction
 - Conjunctivalization
 - Haze
 - Neovascularization



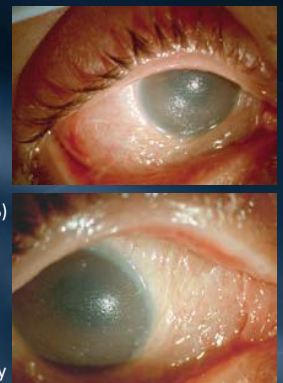
Grade III

- Extensive limbal ischemia
 - 1/3 to 1/2 of limbus
- Loss of most limbal stem cells
- Stromal haze limits visualization of iris and lens
- Prognosis: Guarded
 - Surgery needed for visual rehabilitation



Grade IV

- Complete loss of corneal epithelium and limbal stem cells
- Loss of proximal conjunctival epithelium
- Opaque cornea
 - No view of iris or pupil
 - Porcelainization
- Limbal ischemia (more than 50%)
- Ischemic necrosis of proximal conjunctiva and sclera
- Prognosis: Extremely poor
 - High risk for sterile ulceration and corneal melt
- Even with most aggressive tx limbal stem cell death most likely too advanced



Inflammation Control

- First Wave occurs 12-24 hours after chemical injury with infiltration of peripheral cornea with PMN and mononuclear leukocytes.
- Resulting from:
 - Blood elements from injured vessels in conj and uvea
 - Necrotic tissue of bulbar and tarsal conj
 - Chemotactically attracted byproducts of epi and stromal tissue
- Second, more aggressive wave of inflammatory cell infiltration begins at 7 days and peaks when corneal repair and degradation are maximal (bet 14-21 day)

Grade II –III Medical Management

- Medical Management
 - Topical Pred Forte Q1h or Durezol Q2h x 7 d then taper & switch to
 - 1% topical medroxyprogesterone QID
 - 1% Atropine QD
 - Besivance / Vigamox QID
 - Amniotic membrane by day 3
 - Non-preserved artificial tears q1h
- 100mg Doxycycline BID PO
- 500 mg Diamox BID PO
- Ultram 100mg PO q4-6h
- Topical 10% ascorbate and 10% Citrate Q2h

Case Report

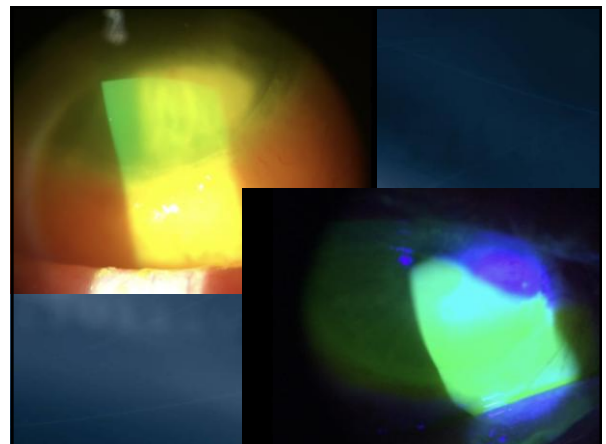
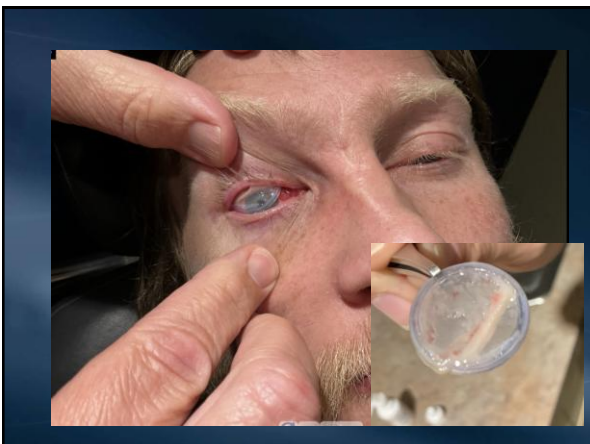
37 yo WM Michael W.

- Dx – Grade III Acid burn of cornea and conjunctiva
 - limbal ischemia 1/3 to 1/2 of limbus
- Plan – normally debride loose tissue
 - Ofloxacin Q2h OD
 - Pred Forte Q30 min x 24 h followed by Q1h OD (delayed by 1 day)
 - Cyclogyl in office OD
 - Erythromycin ung QHS OD
 - Non-preserved artificial tears q1h
 - NO topical NSAID or BSCL
- Rx topical citrate and ascorbate through compounding pharmacy
- Inserted Prokera Slim (Second visit Day3)

Case Report

37 yo WM Michael W.

- Day 3
 - Eye bothers patient more in AM than PM
 - Do not like having this thing in my eye
 - Prokera stuck to lid
 - Pseudomembrane and symblepharon starting
 - VA cc 20/50 PH 20/40
 - Ta = 9mmHg
 - Corneal defect 360 leaving residual central defect
 - Descemet folds and haze noted in stroma



Case Report

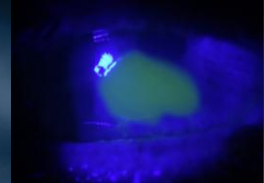
37 yo WM Michael W.

- Dx – Grade III Acid burn of cornea and conjunctiva
- Plan –
 - Ofloxacin Q2h OD
 - Pred Forte Q2h OD
 - Cyclogyl in office OD
 - Erythromycin ung QHS OD
 - Non-preserved artificial tears q1h
- Repeated Prokera Slim x 3

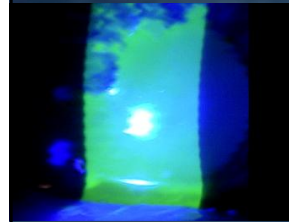
Case Report

37 yo WM Michael W.

- Day 35
 - Feeling better.
 - Vision definitely better.
 - VA sc 20/20-
 - Ta = 12mmHg
 - Punctate keratopathy
 - Stromal haze
- Taper meds
- Continue Refresh PM BID, tears q4h
- PF QD
- Plugs for PED



Case 3



- A 55-year-old female with history of mascara brush trauma several years prior
- She reports complaining of difficulty upon wakening with redness, tearing, photophobia, pain and blurred vision OD
- BVA 20/70 OD, 20/20 OS
- Slit lamp examination
 - irregular epithelium with a large epithelial defect OD.
- Dx with a recurrent corneal erosion

Respond at pollev.com/nicholascola090

Text **NICHOLASCOLA090** to **22333** once to join, then **A, B, C, or D**

When was the last time you saw a patient with a Recurrent Corneal Erosion?

- Within the last Year
- Within the last Month
- Within the last Week
- Within the last Day

Start the presentation to see live content. For screen share software, share the entire screen. Get help at pollev.com/app

Incidence and Prevalence on RCE

- **The incidence and prevalence of recurrent corneal erosion syndrome in London, UK.** *Eye (Lond).* 2023 Oct;37(15):3213-3216. doi: 10.1038/s41433-023-02490-3. Epub 2023 Mar 10.
- A retrospective cohort study over a 5-year period reviewed 487,690 emergency room patient attendances at Moorfields Eye Hospital (MEH) London between 1 January 2015 and 31 December 2019
- Out of 330,684 patients, 3623 patients were given a new diagnosis of RCES by the emergency ophthalmology services.
 - The crude annual incidence of RCES was estimated at 25.4 per 100,000,
 - With a crude prevalence rate of 0.96% (glc prev 2.1% >40 yo).

Recurrent Corneal Erosion

- Chronic relapsing disease of corneal epithelium
- Characterized by disturbance of epithelial basement membrane
 - Defective adhesions
 - Recurrent breakdown of corneal epithelium
 - Redness, photophobia, tearing
 - Usually at night or upon awakening
 - May be related to REM during sleep

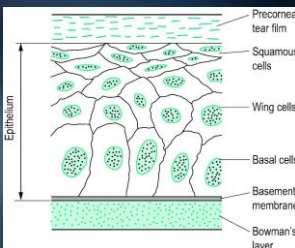
Recurrent Corneal Erosion Syndrome

- Relatively common condition
 - Many cases have past history of trauma
 - Corneal dystrophies
- Management can be frustrating for both patient and doctor
 - Patient discouraged because of recurrent pain and decreased vision
 - Doctor disheartened by inability to cure disease

Recurrent Corneal Erosion

- Recognized as a disease entity for over 150 years
 - First report published in 1872 by Hansen
 - "Intermittent neuralgic vesicular keratitis"
 - Von Arlt published same phenomenon 2 years later
- 1900: Szili reported epithelial irregularities and gray dots associated with recurrent erosion
- 1901: Stood suggested trauma to epithelium and anterior stroma resulted in an inability of new epithelium to form normal attachments to the injured anterior Bowman's layer
- 1921: Vogt described fine white dots on Bowman's layer, NaFl staining, and an irregular epithelial surface with localized edema

Anatomy



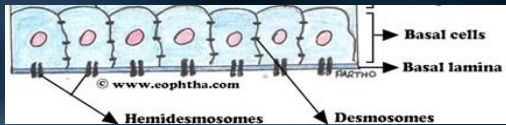
- Corneal Epithelium
 - 5-6 cell layers thick
 - 50um thick
 - stratified squamous to
 - Basilar columnar cell
 - Rapidly renewing tissue which loses its surface cells into tear film
 - Turnover 4-6 days
 - Maintains smoothness of optical surface
 - Barrier against micro-organisms
 - Maintains deturgescence of stroma

Anatomy

- Epithelial cells rest on the basement membrane - 128nm
 - Lamina Lucida – made of glycoprotein laminin
 - secreted by overlying epi
 - Lamina Densa – Made of Type IV collagen
 - secreted by overlying epi
 - Lamina Reticularis – Made of fibronectin
 - secreted by underlying stroma
- Normal adherence to BM maintained by "adhesion complexes":
 - Hemidesmosomes (arrowhead)
 - Lamina lucida and densa
 - Anchoring fibrils (arrows)
 - Laminin
 - Fibronectin
 - Type IV and VII Collagen



Anatomy



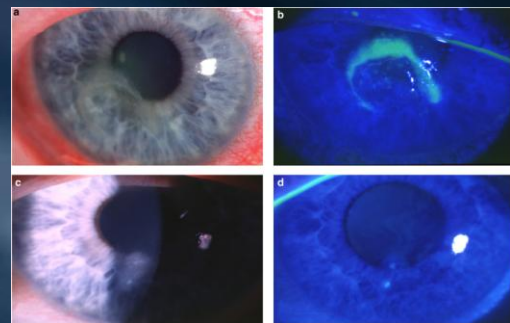
- Numerous hemidesmosomes are scattered on the basal side of the epithelial cells
- Fine fibrils radiate from them into the BM to join the two together
- When epithelial defect occurs fibronectin covers the stroma to help allow adjacent cells to slide over the denuded area
 - Those cells will proliferate to form overlying superficial cells
 - The basal cells will begin to form adhesion complexes with the BM

Pathological Anatomy

- Matrix metalloproteinase (MMP)
 - Name for group of enzymes that break down the structure of the extracellular matrix (collagenase)
 - Gelatinase
 - Composed of MMP-9 and MMP-2
 - Degrades collagen type IV and VII and Laminin
 - all major components of BM
- Elevated levels of MMP-9 and MMP-2 have been observed in tears of patients with RCE
- Increased MMP-9 and MMP-2 expression have been implicated in the pathogenesis of RCE's
 - upregulation may lead to BM degradation and poor epithelial basement membrane adhesion.
- Higher than required levels of MMP may dissolve old and newly forming BM

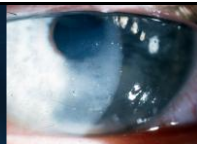
Divisions

- Microform
 - Duration of 30 minutes to several hours
 - Typically have intact epithelial surface
 - More frequent
 - Often associated with EBMD
 - Punctate epithelial erosions
- Macroform
 - May last for several days
 - Pain, photophobia
 - Typically traumatic in origin
 - Frank epithelial defects or large areas of edematous non-adherent epithelium



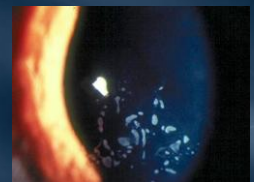
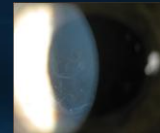
Diagnosis

- SLE with indirect illumination
 - Retroillumination after dilation
- Ragged greyish-staining area of epithelium
- Cellulose sponge test looking for loose epithelium
 - "positive cellulose sponge test"
- Topography



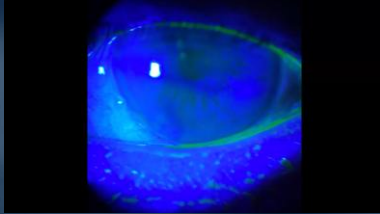
Diagnosis

- Slit lamp
 - Epithelial
 - Microcysts (dots)
 - Reduplication of basement membranes (maps)
 - Extensions of collagenous filaments (fingerprints)
 - Loosely adherent, elevated epithelium
- History
 - Previous trauma?
- Other
 - Pain, photophobia, tearing



Kim Corneal Sweeper

- Developed by Brian Kim, MD
- Try to identify occult RCE

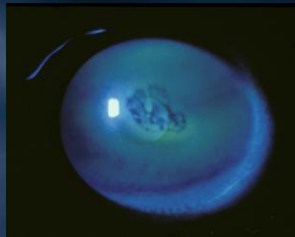


Management Options

- Medical – (>95% successfully managed, 70% remaining symptom free x 1 year, 40% x 4 years)
 - Promoting epithelial regeneration
 - Patching (rare), bandage contact lenses
 - Antibiotics, cycloplegics, hyperosmotics, corticosteroid
 - Oral tetracyclines
- Mechanical
 - When medical management is not successful
 - Debridement
 - Anterior Stromal Puncture (ASP)
- Surgical
 - Phototherapeutic keratectomy (PTK)
 - Diamond burr superficial keratectomy
 - Nd:YAG
 - Alcohol Delamination

Medical Management

- Patching vs. BCL
- Lubrication
- Cycloplegics
- Antibiotics
- Topical NSAIDs?
- Corticosteroids
- Hyperosmotics
- Oral tetracyclines



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Management

- Bandage CL
 - Designed to relieve pain
 - Protect epithelium from eyelids
 - Options
 - Acuvue Oasys (Vistakon)
 - Air Optix Night and Day (Ciba Vision)
 - Ultra (Bausch and Lomb)
 - Biofinity (CooperVision)

Management

- Bandage CL
 - Lens should be fitted fairly tightly
 - Minimum of 6 weeks is needed to allow BM remodeling to return to normal
 - On a continuous wear basis
 - Concerns?

Fraunfelder F, Cabezas M. *Treatment of Recurrent Corneal Erosion by Extended-wear Bandage Contact Lens.* Cornea. Feb 2011

- 12 patients fit with EW BSCL x 3 months
 - Replaced q2weeks
 - Prophylactic ofloxacin BID
 - All patients felt immediate relief after BSCL insertion and during 3 month period
 - 75% asymptomatic after 1 year

Medical Management

- Lubrication
 - Gels, drops, ointments
 - Reduces friction
 - Maximizes health of tear film
- Cycloplegics
 - Reduce secondary inflammation
 - Improve comfort
 - Homatropine 5% BID
- Antibiotics
 - Prophylaxis
- Topical NSAIDs
 - Used for analgesia
- Corticosteroids
- Autologous Serum

Medical Management

- Hyperosmotics
 - Produce an osmotic gradient
 - Promote epithelial adherence
 - Minimize epithelial edema
 - Occurs overnight when lids are closed



Medical Management

- Doxycycline
 - Inhibits MMP
 - Improves meibomian gland dysfunction
 - Doxycycline shows 70% decrease in MMP activity in corneal cultures
 - No recurrences after 21.9mo follow up
 - Dosage may vary
 - Sub anti-microbial dose
 - 20 mg to 50 mg BID
 - Treatment for minimum of two months following RCE

AzaSite

- AzaSite qhs in all cases of RCE in the presence of lid disease
- shown to inhibit MMP-9 in epithelium and endothelium
- May be better tolerated than DCN
- Off label
- Cost is concern



Corticosteroids

- Research shows that corticosteroids inhibit MMP-9 and other enzymes that are known to cause epithelial breakdown specifically in RCE
- Lotemax qid x 2 weeks then bid x 6 weeks
 - Concern of long-term Tx
 - Side Effects (check IOP within 1 month)



Dursun D. Kim M, et al. *Treatment of Recalcitrant Recurrent Corneal Erosions with Inhibitors of Matrix Metalloproteinase-9, Doxycycline and Corticosteroids.* Am J Ophthalmol. July 2001

Wang L et al. *Treatment of recurrent corneal erosion syndrome using the combination of oral doxycycline and topical corticosteroid.* Clin Exp Ophthalmol. 36:2007.

FreshKote

- Has a high oncotic pressure
 - Re-establishes integrity of epithelium
 - Reduces microcystic edema
 - Prevents recurrent damage
- Safe for CL wearers



Cyclosporin, lifitegrast, and punctal plugs

- Bernauer et al.
-Due to thinning of the tear film, the lids might have tight adherence to the surface of the cornea overnight leading to tearing of epithelium upon waking



Autologous Serum

- Use first described in 1984 by Fox et al (for keratoconjunctivitis sicca)
- Unpreserved, non-antigenic
- Utilizes patients own blood serum
- Blood is drawn and serum is spun down and mixed with artificial tears.
 - Doesn't contain red blood cells and clot factors
- Replaces individualized antibodies



Autologous Serum

- When applied on RCE
 - Extra supply for necessary glucose, proteins and calcium for the epithelium to migrate rapidly
 - Speeding up first phase of wound healing
 - Vitamin A and fibronectin also help speed this up
- Affects final phases of wound healing by supplying necessary extracellular matrix components
- Supplies growth factors that activates keratocytes to produce extracellular matrix components

Autologous Serum

- Study in 2010 – 33pt
 - 6x/day for 3 months, followed by 4x/d for 3 months
 - Patients seen 1d, 3d, 1 week, every month x 12, then every 3 months
 - 28pts (85%) no recurrence
 - 2.5 years
 - Recurrence rate of 15% over 30 mo period makes it viable option
 - 85% success

Ziakas N et al. *Long-Term follow up of autologous serum treatment for recurrent corneal erosions.* Clin Exp Ophthalmol. 2010;38 683-687.

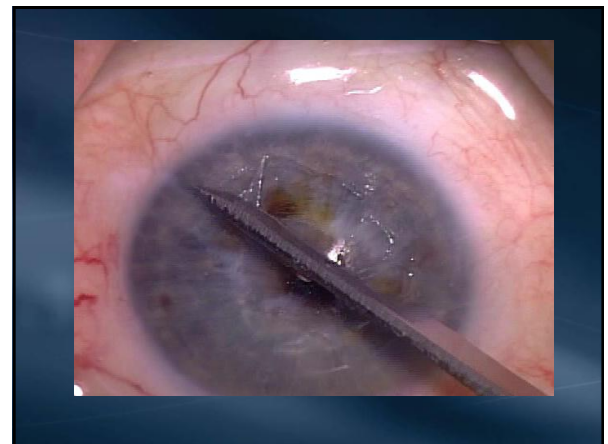
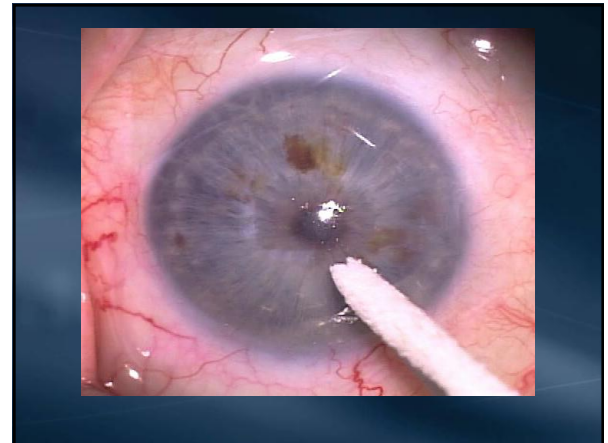
- Costly - \$150-300 time, 2-4x /year
- Inconvenient - Requires blood donation from patient
- Possible risk of infection

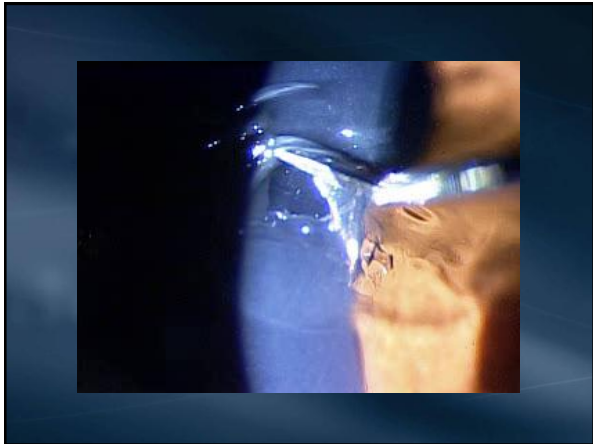
Mechanical and Surgical Management

- Epithelial Debridement
- Sutureless Amniotic Membranes
- Anterior Stromal Puncture
- Nd:YAG Puncture
- Phototherapeutic Keratectomy (PTK)
- Alcohol Delamination
- Superficial Keratectomy

Epithelial Debridement

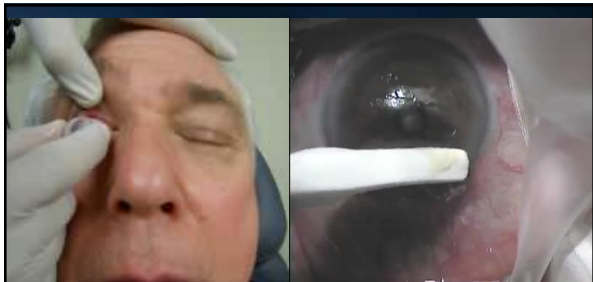
- Use cotton swab, spatula, spud, or jewelers forceps
- Begin by softening epithelium by instilling topical anesthetic q 15-30 sec for 1-2 min
- Work toward the center of the cornea
- Avoid pulling up or out
- Try to keep straight, firm edges
- Key is to make sure to get Bowman's smooth
- BCL, topical antibiotics, topical NSAIDs PRN
- Oral analgesics if needed
- CPT 65435
- ED success 65-82% (varies)





Sutureless Amniotic Membranes

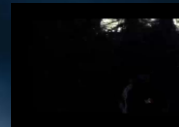
- Sutureless Amniotic membrane
 - Innermost of 3 membranes forming the fetal membrane
 - Avascular and acellular. It will facilitate epithelial healing
 - Combined action helps stimulate epithelialization
 - Easy to insert in the office, bed side
 - Monitor healing by fluorescein and IOP by Tonopen™ without removal
 - Does not interfere with antibiotic penetration



- Facilitates healing in most defects within 5-10 days at which point the membrane in the device will naturally dissolve.

- 65778 (the CPT code)

Anterior Stromal Puncture



- First described by Mclean, et al 1986
- 20-25 gauge disposable hypodermic needle
- Under slit lamp making multiple punctures through loose epithelium and Bowman's membrane into ant half of stroma.
- Approx 15-25 punctures spaced 0.5mm apart
- Orient needle perpendicular to corneal plane
- Exert enough pressure to indent the cornea one quarter to one-third depth of A.C. (0.1mm adeq)

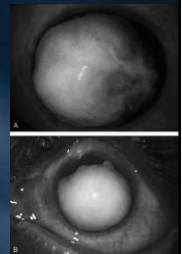
Anterior Stromal Puncture

- Believed that breaching of Bowman's stimulates a more secure bonding of epi to the underlying BM, Bowman's and stroma
- Following ASP
 - BSCL (2 weeks)
 - Fluoroquinolone AB
 - Steroid
 - Non-preserved artificial tears



Anterior Stromal Puncture

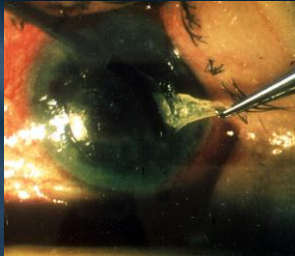
- Potential Side Effects
 - Corneal perforation
 - Scarring due to deep penetration
 - Best utilized for pts w periph etiology
 - Microbial keratitis
 - Anterior uveitis
 - DLK in post-LASIK patients
 - Sub epithelial fibrosis
 - following Bullous Keratopathy
 - Delayed 1-2 years
 - Most likely pre-existing
 - Tx w Superficial Keratectomy to remove membrane



- CPT 65600 (multiple punctures of anterior cornea) \$499.79
- ASP with Needle 60-88%

Superficial Keratectomy

- Total superficial keratectomy w blade or diamond knife.
- Dystrophic epi and BM are peeled in one continuous sheet leaving undisturbed Bowman's



- SK with blade 67-82%
- SK with Diamond burr 75-100%

Superficial Keratectomy

- Superficial Keratectomy
- Amoils Epithelial Scrubber
 - Handle with battery operated motor
 - Rotates a disposable, circular brush
 - Originally designed to remove central epithelium prior to PRK
 - Effective for treating recalcitrant RCE
 - Applied for longer duration to central and peripheral cornea



Video courtesy of Drs. Hodkin and Jackson

- Figure 1. (Hodkin) The end of the AES with the attached rotary brush held above a patient's eye. During the procedure, the patient's head is rotated slightly toward the operative eye and irrigation solution is dripped onto the cornea while the brush is maneuvered to debride the corneal surface.



- 88% success

Phototherapeutic Keratectomy (PTK)

- Use of excimer laser to smooth Bowman's
- Epithelium removed manually or with blade / alcohol
- Often used for recalcitrant cases
- Objective
 - remove enough of the superficial Bowman's layer to permit formation of a new basement membrane with adhesion structures
- Technique
 - Debride the epithelium in the involved area
 - Use large spot size (5 mm)
 - Apply 16 pulses
- No optical effect is seen with such a superficial ablation

Phototherapeutic Keratectomy (PTK)

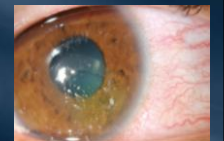
- Transepithelial PTK (t-PTK)
 - Same as PTK, though excimer is used to remove epithelium
 - Holzer et al showed 80% had no RCE for 6-20 months
 - No statistical significant change in refraction
 - Ardjomand et al modified epithelial removal
 - Hinged at 12 o'clock
- Higher success rate in secondary cases (trauma)
- Can be combined with PRK in appropriate cases

Phototherapeutic Keratectomy (PTK)

- Risks
 - Post-operative haze
 - Potential for hyperopic shift
 - Pain
- PTK 46-100%

Alcohol Delamination

- Quick, safe and economical
- Performed in controlled setting
 - Epithelium very sensitive to alcohol
- 20% ethanol for >30sec
 - Splits epithelium from stroma at level of Lamina lucida (leaves) and densa (stays)
 - Proteinaceous or cellular debris is removed
 - Collagen VII remains
 - Allowing new anchoring fibril formation



Alcohol Delamination

- Absolute Ethyl Alcohol is diluted to 20% w sterile water in 1 ml syringe
- Circular well sufficient to encompass area of erosions
- Few drops of 20% alcohol are dropped in well and left in place for 30 sec
- Alcohol is then drained w surgical sponge
- Irrigate with BSS
- Dry surgical sponge then removes epi in single sheet
- BSCL

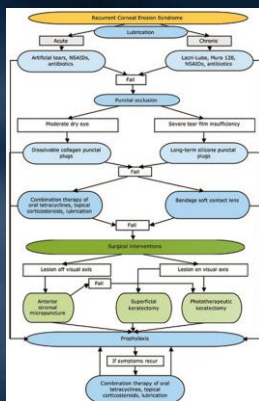


Mencucci R, Dua H. et al. *Alcohol delamination in the treatment of recurrent corneal erosion: an electron microscopic study.* BJO 94.2010

- 17 patients failed conservative treatment
- 83% success first year

Stepwise Approach

- Medical Management
- ↓
- Bandage CL
- ↓
- Epithelial debridement
- ↓
- Autologous Serum
- ↓
- Surgical Intervention



Stepwise Approach

- Medical Management
- Bandage CL
- Epithelial debridement
- Autologous Serum
- Surgical Intervention

Controlled Studies on RCE

- [Cochrane Database Syst Rev. 2018 Jul 9;7\(7\):CD001861. doi: 10.1002/14651858.CD001861.pub4. Interventions for recurrent corneal erosions](https://doi.org/10.1002/14651858.CD001861.pub4) Stephanie L Watson 1, Vanessa Leung Affiliations expand PMID: 29985545 PMCID: PMC6513638 DOI: [10.1002/14651858.CD001861.pub4](https://doi.org/10.1002/14651858.CD001861.pub4)
- [Cochrane Database Syst Rev. 2012 Sep 12;9:CD001861. doi: 10.1002/14651858.CD001861.pub3. Interventions for recurrent corneal erosions.](https://doi.org/10.1002/14651858.CD001861.pub3) Watson SL, Lee MH, Barker NH. Save Sight Institute, Sydney, Australia. stephanie.watson@sydney.edu.au.
- [Cochrane Database Syst Rev. Interventions for recurrent corneal erosions. Cochrane Database of Systematic Reviews 2007, Issue 4. Watson SL, Barker NH. Art. No.: CD001861. DOI: 10.1002/14651858.CD001861.pub2.](https://doi.org/10.1002/14651858.CD001861.pub2)

Medical Combination Tx

- Muro ung qhs >>> FreshKote gtts TID >>> Lotemax qid x 2 weeks then bid x 6 weeks >>> AzaSite
- Muro ung qhs >>> FreshKote gtts TID >>> Lotemax qid x 2 weeks then bid x 6 weeks >>> DCN
- Muro ung hs >>> FreshKote gtts TID >>> Autologous Serum >>> DCN
- Lotemax >>>DCN

Mechanical Combination Tx

- Epi debridement >>> Amniotic Membrane >>> >>> Autologous Serum >>> DCN
- Epi Debridement >>> EW BSCL 12 weeks >>> DCN >>> Lotemax
- ASP >>> BSCL 12 weeks >>> DCN >>> Lotemax

Surgical Combination Tx

- When to refer???:
 - After repeated medical and mechanical management failure
- Alcohol Delamination >>> BSCL x 12 weeks >>> DCN >>> Lotemax
- SK >>> BSCL x 12 weeks >>> DCN >>> Lotemax, Azasite

Case Study

- Combined four treatment modalities together
 - Corneal debridement
 - Removal of loose epithelium by mechanical debridement Strengthens the adhesion of the basal epithelial cells to the basement membrane (Maini 2002; Ohman 1998).
 - AmbioDisk dehydrated amniotic membrane
 - Amniotic membrane therapy decreases inflammation and replaces key components of the basement membrane to facilitate proper adhesion of anchoring connections
 - Extended wear BSCL (12 weeks)
 - A therapeutic contact lens protects the epithelium from the shearing force of the lids (Liu 1996; Williams 1985, Fraunfelder 2011).
 - Oral doxycycline
 - Oral tetra / doxycycline inhibit matrix metalloproteinases and hence reduce protein breakdown to preserve the bond between the epithelium and basement membrane. (Durson 2001, Hope-Ross 1994)



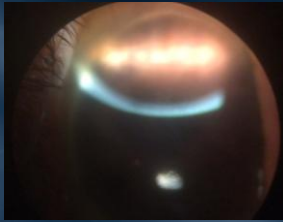
Case 5

Case Study

- TD, 38 year old white male
- Referred to me by his PCP
- Patient complains of:
 - Redness, pain, photophobia OD x 6 days
 - Tobramycin QID not effective
- Reports unremarkable medical and ocular history
- Entering VA 20/20 OD, OS
- PERRL

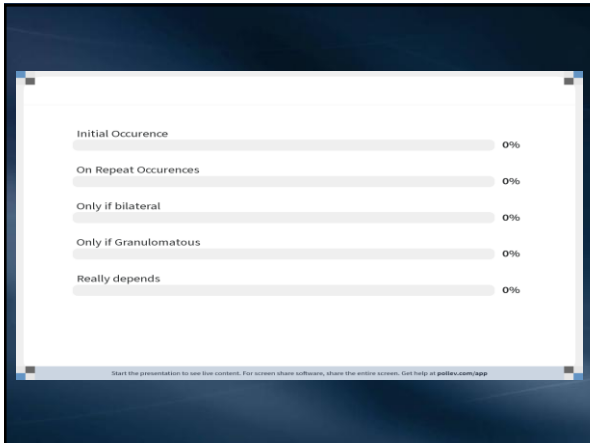
Case Study, Day 1

- Slit lamp exam
 - 3+ cell OD, fine KP
 - Minimal injection
 - IOP 12 mm OD, OS
- Fundus exam
 - Unremarkable OU
- Diagnosis: ??
- Plan
 - Start Pred Forte Q1H OD
 - FML ointment QHS OD
 - Atropine 1% daily OD
 - RTO x 1 day



Case Study, Day 2

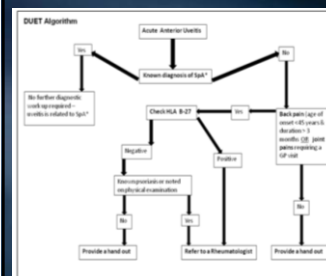
- Patient slightly more comfortable
- VA 20/20 OD, OS
- Pupils: Dilated OD
- 2+ to 3 cell, fine KP
- IOP 13 mm OU
- Continue current treatment- RTO x 3-4 days
- Blood work requested



Laboratory Testing Guidelines

- There are no evidence-based guidelines for testing for uveitis
- First episodes of acute anterior uveitis, especially if mild, unilateral, non-granulomatous, and responsive to topical corticosteroids probably do not require diagnostic evaluation unless there is evidence for an underlying etiology
 - diagnostic testing for first episodes of uveitis should be obtained when there is a high index of suspicion regarding an underlying cause
 - the inflammatory response appears granulomatous
 - or the inflammation fails to respond to therapy within a reasonable time
 - Diagnostic evaluation is also recommended for all patients with recurrent or chronic inflammation
- There is no "standard" uveitis workup
 - The workup must be custom tailored for each patient depending on history, features of disease presentation, and risk factors

Dublin Uveitis Evaluation Test



- 40% patients idiopathic AAU have undiagnosed SpA
- A simple to apply algorithm is described with excellent sensitivity and specificity
 - 95% Sensitivity
 - 98% Specificity

Ann Rheum Dis. 2015 Nov;74(11):1990-5. doi: 10.1136/annrheumdis-2014-205528. Epub 2014 Jun 13. A novel evidence-based detection of undiagnosed spinal arthritis in patients presenting with acute anterior uveitis: the DUEET (Dublin Uveitis Evaluation Test). Davern MJ, O'Rourke MG, Ramanany PS, Murray CC, FitzGerald OI.

Case Study, Day 7

- Rescheduled visit for Day 5
- Significant improvement in signs and symptoms
- Discontinued atropine, starting tapering steroid

Case Study

- Blood work
 - CRP: normal
 - ESR: normal
 - ANA: negative
 - RF: normal
 - Lyme serology: normal

BLOOD COUNTS		
WBC	Label Range: 5.0-10.0 x10 ³ /L	4.3
HGB	Label Range: 13.0-16.0 g/dL	14.0
Hematocrit	Label Range: 37.0-47.0 %	41.0
Hemoglobin	Label Range: 13.0-16.0 g/dL	14.0
MCV	Label Range: 85-105 fL	98
MCH	Label Range: 27-34 pg	28
MCHC	Label Range: 32-36 g/dL	28
Reticulocyte	Label Range: 0.0-1.5 %	0.0
Platelet	Label Range: 150-400 x10 ³ /L	260
Neutrophil	Label Range: 57-70 %	57
Lymphocyte	Label Range: 20-40 %	37
Monocyte	Label Range: 2-8 %	4
Eosinophil	Label Range: 0.5-5 %	0
Basophil	Label Range: 0.0-1 %	0
Immature Granulocyte	Label Range: 0.0-0.5 %	0
CHEMISTRY PANELS		
Aspartate Aminotransferase	Label Range: 0-37 U/L	
Alanine Aminotransferase	Label Range: 0-40 U/L	
COAG TIME'S		
PT/INR	No range found	
APTT	No range found	
Fibrinogen	No range found	
D-Dimer	No range found	
ADULT CHEMISTRY		
Glucose	Label Range: 70-100 mg/dL	92
BUN	Label Range: 7-20 mg/dL	8
CREATININE	Label Range: 0.6-1.3 mg/dL	0.8
UA	No range found	
AMYLASE	Label Range: 30-100 U/L	40
LIPID PANEL	No range found	
TRIGLYCERIDES	Label Range: 0-160 mg/dL	110
LDL CHOLESTEROL	Label Range: 0-130 mg/dL	110
HDL CHOLESTEROL	Label Range: 20-160 mg/dL	110
TOTAL CHOLESTEROL	Label Range: 0-240 mg/dL	110
URIC ACID	No range found	

What other labs would you order?

Nobody has responded yet.
Hang tight! Responses are coming in.

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Case Study

- Resubmitted for blood draw

Physician: JEFFREY RICHARD VARANELLI, MD	NPI: 1396792016
Location: Beaumont Laboratory Services	Loc ID: 99999
Collected: 9/19/2016 10:14 AM	Received: 9/19/2016 3:32 PM
Lab Order#: 891904832	
Test Names: HLA B27 Screen	
Results:	
Marker Name	B27 result
HLA B27	Positive
	Abnormal Flag B27
	A

Case Study

- Next steps
 - Recommend establishing relationship with subspecialist
 - Educate patient on potential chronic, recurrent nature
 - Long term options with recurrences?
 - Anecdotal evidence that Restasis may have some benefits in preventing or reducing frequency of recurrences
 - Topical cyclosporine A 0.05% for recurrent anterior uveitis
 - Prabhu SS, Shtein RM, Michelotti MM, Cooney TM
 - Poster Presentation ASCRS 2014

Human Leukocyte Antigen Testing

- Human leukocyte antigen disease
 - HLA– disease associations are simply associations between a major histocompatibility complex molecule, and a clinical condition
 - Testing for HLA can provide supportive evidence for a particular diagnosis but cannot make a definitive diagnosis
 - Statistically it is the increased frequency of an HLA haplotype in persons with that disease, as compared to the frequency in a disease free population
 - The ratio of these two frequencies is the “relative risk”
- Ocular disease associations with HLA Testing
 - HLA-B27 HLA-A29
 - HLA-B51 HLA-DRB1*0102

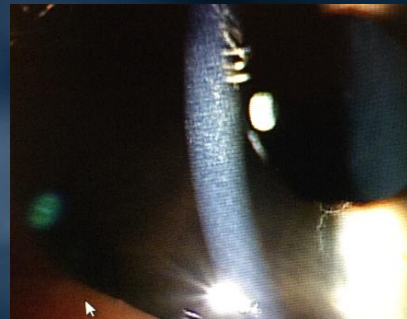
Human Leukocyte Antigen Testing

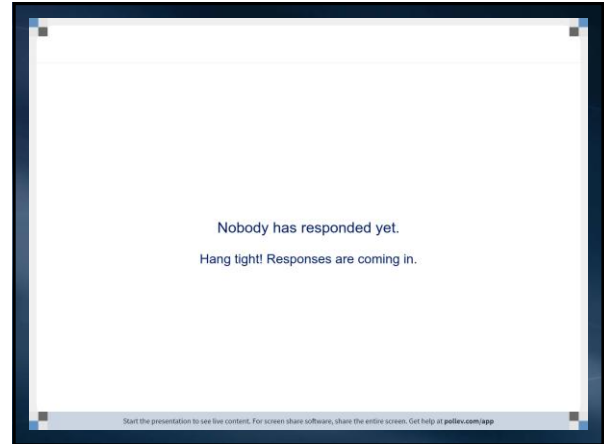
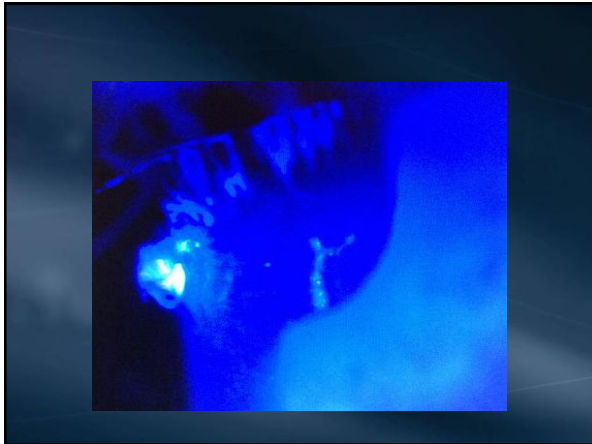
- HLA-B27 positivity is associated with a number of presumed autoimmune diseases (seronegative spondyloarthropathy) :
 - Ankylosing spondylitis
 - Reactive arthritis
 - Psoriatic arthritis
 - Inflammatory bowel disease

Case 6

Case Study

- 17 yo white male, Logan K
 - c/o red, painful, irritated left eye
 - Been going on for almost a month
 - 2 weeks ago went to ER and given Polytrim. Since then, no real improvement
- Wearing Biofinity DW, reports good compliance, no EW, but wearing them today (with the red eye)
- Vacc 20/20 OD, 20/30 OS (-4.00 OU)
- Also had infection on forehead just prior, Dx as “dermatitis or impetigo” which had oral AB
- He is also a wrestler and routinely has face smeared into mat
- And after each match usually goes into hot tub to relax muscles, etc, while wearing CLs (may have gone under)
- December 25






- Cultured everything
- Performed corneal sensitivity
 - Was reduced objectively and subjectively OS
- Presumptive Dx of Herpes Simplex Keratitis (dendrite and marginal keratitis)
 - Started Zirgan 5x/day
 - Besivance q2h
 - Debride vs no debridement
 - Also started on Oral Acyclovir 400mg 5x/day
- But had notes in chart saying
 - Concerned about Acanthamoeba. Also worried about NTM due to face in mat and possibly even Nocardia. If not improved in next couple of days switch to fortified Amikacin and consider PHMB

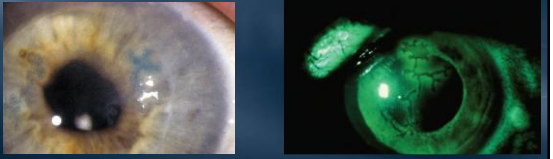
HSV Keratitis – Dendritic Ulcers

- Most common form of HSV keratitis
 - Dendrite is derivative of "dendron" Greek word for tree
- Linear, branching lesion, swollen epithelial borders, terminal bulbs
- Stains positively w FL along length
 - Rose Bengal or Lissamine Green at epithelial borders
 - Do cultures prior to RB
- Contains live virus
- Central ulceration through basement membrane
 - Ulcerated and not raised as VZV pseudodendrites & healing epithelial defects



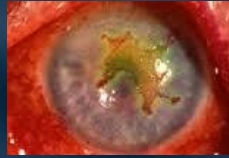
HSV Keratitis – Dendritic Ulcers

- Dendritic ulcer may result in abnormal-appearing epithelium for several weeks after ulcer heals
 - i.e. HSV "Dendritic Epitheliopathy"
 - Lesion is dendritic in shape, but not ulcerated
 - Stains negatively along length of lesion
 - Represents healing epithelium and no antiviral is needed



HSV Keratitis – Geographic Ulcer

- Enlarged or expanding dendritic ulcer
- True ulcer that has live virus and extends through basement membrane
- Typically has swollen scalloped epithelial borders
 - Differentiates from smooth borders of neurotrophic ulcer and healing abrasions
- Wilhelmus et al
 - 22% of all initial infections
 - Associated with longer duration and topical corticosteroids



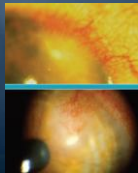
HSV Keratitis – Marginal Ulcer

- Uncommon and often confused with Staph Marginal disease
- Result of active live virus in close proximity to limbus
- Unique clinical features
 - Epithelial lesion (perhaps dendrite) with underlying anterior stromal infiltrate and adjacent limbal injection



HSV Keratitis – Marginal Ulcer

- Patient extremely symptomatic due to inflammatory nature
- More difficult to treat
 - If inappropriately treated with corticosteroids, will progress centrally with ulceration and subepithelial infiltration (takes on dendrite pattern)

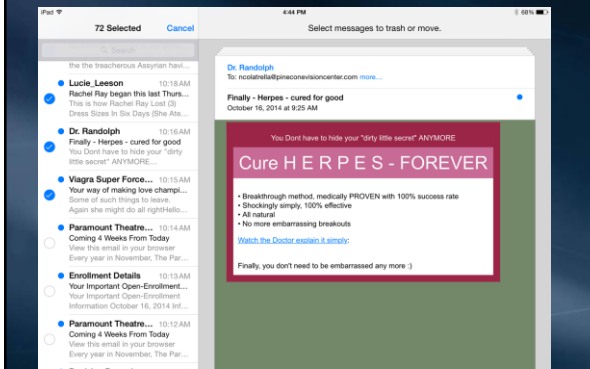


HSV Keratitis – Marginal Ulcer

- Ways to help differentiate

Features	HSV Marginal Ulcer	Staph Marginal Infiltrate
Etiology	Active HSV	Immune response to staph antigen
Epithelial Defect	Always	Absent (unless late)
Neovascularization	Often	Never
Progression	Centrally	Circumferentially
Blepharitis	Unrelated	Usually
Location	Any meridian	Typically 2,4,8,10 O'clock meridians

HSV Keratitis – Epi Keratitis Management



HSV Keratitis – Epi Keratitis Management

- Physical debridement of dendrite w cotton tip applicator with topical or oral Tx:
- Topical
 - Trifluridine (Viroptic) q2H until epithelium is healed, then qid x 7 days
 - Gancyclovir (Zirgan) 5x daily until epithelium is healed, then tid x 7 days
- Oral
 - Zovirax (acyclovir) 400mg five times daily for 10 days
 - Valtrex (valacyclovir) 500mg three times daily 10 days
 - Famvir (famciclovir) 250mg three times daily 10 days.
- Prophylaxis with broad spectrum AB prudent, esp when treating large geographic ulcers

Case 7

Case Report

- Mary M 54 yo WF presents C/O ocular pain OS.
 - School psychologist
- Pressure feeling around eyes. Eyes are red OS>OD
 - Pain radiates up into temples
 - Went to PCP and had work up for sinuses and AB. NO help
 - Seem to water excessively
 - Symptoms began recently – days
 - Episodes are persistent
 - Discomfort is bothersome

Case Report

- Oc Hx
 - Floppy Eyelid Syndrome
 - PVD OS
 - Myopia, astigmatism, presbyopia
 - SCL wearer
- Medical Hx
 - Osteoarthritis
 - HTN
 - GERD
 - Overactive bladder
 - Family Hx
 - RA mother
- Meds
 - Atenolol
 - BCP
 - Detrol LA
 - Omeprazole
 - Glucosamine
 - Vitamins
- Med allergies
 - PCN, Sulfa, Emycin

Case Report

- VA CC
 - OD 20/25 OS 20/40 PH 20/25
- Tonometry
 - OD 20mmHg, OS 20mmHg
- Pupils, EOM's, Conf FULL
- SLE
 - LL –cl
 - Conj / Sclera
 - Tr inj OD,
 - 2+ diffuse inj OS Sup>inf
 - Does not blanch with PE
 - Cornea – cl
 - AC –D/Q
 - I-nl
 - L – Cl
 - Vit-cl
 - ON –.2rd OU, flat
 - Macula
 - OD Cl, OS ERM



Case Report

- Impression
 - Diffuse Ant Scleritis OS
- Plan
- ?????

Topical Corticosteroid	0%
Oral NSAID	0%
Oral Corticosteroid	0%
Immunomodulator	0%



Scleritis Treatment – Non-infectious

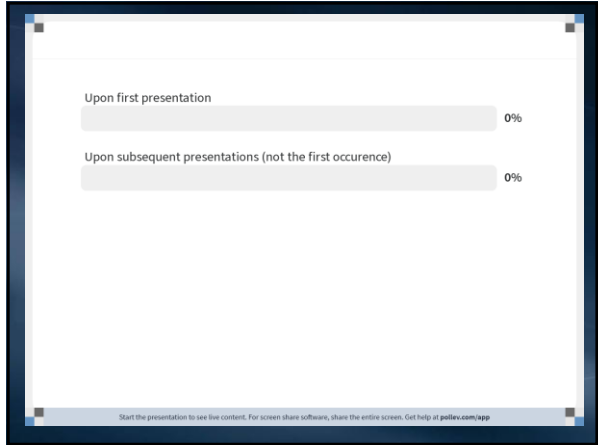
- Scleritis almost always requires treatment with systemic medications.
- First line is oral NSAID w or w/o topical steroid
 - 100mg Flurbiprofen TID PO
 - 500mg Diflunisal BID PO
 - 400-600mg Ibuprofen QID PO
 - *50mg Indomethacin TID PO
 - *400-600mg Oxyphenbutazone QD
 - 375-500mg Naproxen TID PO
 - Response within 2-3 weeks
 - Sequential trials
 - Selective COX-2 inhibitor
 - 92% success in diffuse & nodular
- Prednisone 1 -1.5 mg/kg/d x 7-14 d
 - 60-120mg / d
 - Taper 10mg/wk until 20mg then?
- IV Methylprednisolone 1g/d x 3d
- Periocular steroid
 - Sub conj
 - ?scleral melting and perforation
 - Orbital floor
- Amitriptyline for pain out of proportion of signs
- Reduction in pain for all tx is good indicator of tx success

Scleritis Treatment – Non-infectious

- Immunosuppressive therapy
 - Mono or steroid sparing Immunomodulatory Therapy (IMT)
 - Antimetabolites
 - Methotrexate
 - Azathioprine
 - Mycophenolate mofetil (MMF)
 - Alkylating agents
 - Chlorambucil
 - Cyclophosphamide
 - T-Cell inhibitors
 - Cyclosporine
 - Tacrolimus
 - TNF –α inhibitors
 - Infliximab (Remicade)
 - Adalimumab (Humira)
 - Daclizumab
 - Monoclonal ab against CD-20
 - Rituximab

Response can take up to 3 weeks and usually requires months of treatment

52% mortality taking NSAID's or systemic steroids when RA and PUK. 0% on IMT



Scleritis – Associated Diseases

- Scleritis may be the presenting clinical manifestation of a systemic disease in 40-57% patients
 - 30-48% connective tissue or vasculitic disease
 - 5-10% have infectious etiology
 - 2% Atopy, rosacea, gout
- Anterior Scleritis –
 - Diffuse 33% and Nod 50%
 - RA most common
 - Wegener granulomatosis
 - Relapsing polycondritis
 - SLE
 - Arthritis with inflamm bowel dis
 - Ankylosing spondylitis
- Necrotizing w Inflamm 50%
 - Wegener
 - RA
 - Polyarteritis nodosa
 - Relapsing polycondritis
- Necrotizing w/o inflamm 100%
 - RA
 - porphyria
- Posterior Scleritis 10%
 - RA
 - SLE
 - Psoriatic arthritis
 - Wegener
 - PAN
 - Polycondritis
 - Infectious (lyme, toxo, HZ)
- Underlying dis may not be Dx 22yr

Scleritis – Laboratory Testing

- The testing of scleritis even with the initial presentation requires a thorough diagnostic evaluation to include:
 - CBC – Non specific: infection, tumor, other
 - Urinalysis – kidney / liver dysfunction, metabolic disease
 - Serum chemistries
 - BUN, Creatine, CO2 – Non specific: vasculitis-ind renal dis
 - FTA-ABS and RPR – syphilis screening / determination
 - RF -RA
 - ESR – Non specific systemic inflammation
 - ANA – RA, SLE, Collagen Vascular Disease
 - ANCA – Wegener’s, polyarteritis nodosa
 - P-ANCA C-ANCA
- Chest radiograph – TB, Sarcoid, Wegener’s

Scleritis – Laboratory Testing

- Additional testing to consider in appropriate clinical context
 - HLA – typing (B27 etc) – HLA related inflamm dis, A.S.
 - ELISA - Lyme serology, HIV
 - Sinus Radiography – Wegener’s granulomatosis
 - Sacroiliac Radiography – A.S.
 - PPD – TB
 - C-Reactive Protein – Non specific systemic inflamm
 - Uric Acid – gout
 - Circulating immune complexes – RA, SLE, Cogan’s
 - Cryoglobulins – RA, SLE
 - ACE - Sarcoid
 - B Scan ultrasound – post Scleritis suspected
 - Scleral biopsy – infectious dis, FB and rare causes

Case Report

Impression

- Diffuse Ant Scleritis OS

Plan

- 100mg Flurbiprofen TID PO
- Pred Forte QID OS
- Labs ordered (pt reports vials and vials of blood taken)
 - CBC, ANCA, FTA-ABS, RF, HLA, ANA, Lyme, Urinalysis, serum chem
- NO SCL wear
- RTO 2 weeks, immediately if changes or if pain worsens

Case Report

- 2 week follow up exam
- Pt reports minimal improvement in pain and HA

LL –cl
 Conj / Sclera
 CI OD,
 1+ diffuse inj OS Sup>inf
 Cornea – cl
 AC–D/Q
 I-nl
 L – CI
 Ta OS= 34

- Plan
- D/C Flurbiprofen
 - Start Aleve (Naproxen 200mg) BID PO
 - Recommended Naprosyn 375-500 BID PO)
- D/C Pred Forte
- Start Combigan, Lotemax taper
- Lab results
- RTO 2 weeks

Case Report

- 2 week follow up exam
 - 1 mo since presentation
- Pt reports improvement in pain and HA. Feeling back to normal
 - “Best I have felt in months”

LL –cl
 Conj / Sclera
 CI OD
 CI OS

Cornea – cl
 AC–D/Q
 I-nl
 L – CI

- Ta OS= 16

- Plan
- Continue Aleve (Naproxen 200mg) QD PO
- D/C Combigan
- RTO 1 month
- Recurrences

Conclusion

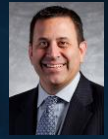
- Whenever attending a lecture, go with the goal of learning new thoughts and techniques
 - Acquire NEW knowledge
- Be ready to change or at least question your previous behavior / routine
- With the overall objective of improving patient outcomes

Conclusion

- All eye care providers who treat patients with Anterior Segment Disease must exercise their clinical skills and judgement to screen for and identify patients with Anterior Segment Disease
- The treatment of the Ocular Surface remains something of an art form, not easily lending itself to a rigid, evidence-based algorithms that accommodates all patients with symptoms or signs
- Don't wait to treat. Early diagnosis and treatment is critical to prevent long term complications and decreased Quality of Life scores



Thank you



Please feel free to contact us:

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